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C-A OPERATIONS PROCEDURES MANUAL

(Collider Electrical Power Supply Group Procedure CPS-006)

Note: This document was formerly a C-A Group Procedure. The content of the group procedure was reviewed by the Technical Supervisor. All approvals and/or issue dates of the original group procedure are maintained for present use.

15.2.6 Lockout Procedure for the Yellow IR Quadrupole Rack Mounted Nested Power Supplies or QPA's During Running Periods when a Power Supply Must be Replaced

Text Pages 3 through 6

Appendices Pages 7 through 13

Hand Processed Changes

<u>HPC No.</u>	<u>Date</u>	<u>Page Nos.</u>	<u>Initials</u>
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Approved: \_\_\_\_\_  
Collider-Accelerator Department Chairman Date



Procedure: C-A-CPS-006  
Revision: 03  
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**COLLIDER-ACCELERATOR DEPARTMENT**

Title: Lockout Procedure for the Yellow IR Quadrupole Rack Mounted Nested Power Supplies or QPA's During Running Periods when a Power Supply Must be Replaced

Author: D. Bruno

Group: Collider Power Supply

**Group Leader concurrence indicates procedure is still current.**

Group Leader: Donald Bruno *Signature on File* Date: 1/11/07

**This Procedure Must Be Reviewed By The Technical Supervisor Prior to use.  
If This Procedure Does Not Reflect Current Equipment/Processes  
Then Immediately Notify The Group Leader**

## **15.2.6 Lockout Procedure for the Yellow IR Quadrupole Rack Mounted Nested Power Supplies or QPA's During Running Periods When a Power Supply Must be Replaced**

### **1. Purpose**

- 1.1 This procedure provides instructions to the Collider Electrical Power Supply Group (CEPSG) technicians and the Collider-Accelerator Support (CAS) technicians on the proper lockout that must be done before you replace a rack mounted nested Yellow IR quadrupole power supply (p.s.) or QPA.

#### **Caution:**

This lockout procedure can only be used in preparation to replace a Rack Mounted Nested Yellow IR Quadrupole P.S. or QPA during running periods. See Appendix 1 for a complete list of the sitewide names of these Rack Mounted Nested Yellow IR Quadrupole P.S.'s and QPA's. Blue P.S.'s are also on this list. If the sitewide name of the Yellow p.s. or QPA that must be replaced is on the list in Appendix 1 then you can use this procedure.

- 1.2 C-A Policy states that the preferred method to protect workers from energy sources is Lockout-Tagout (LOTO). There is no need to place a tag on the lock if the lock will not stay on past 1 shift or overnight as is consistent with standard LOTO Procedures.
- 1.3 Running Periods are defined as those periods when the C-A Main Control Room (MCR) has a scheduled operator on watch 24 hours a day and beam is being delivered or beam is being prepared to be delivered to RHIC.

### **2. Responsibilities**

- 2.1 Responsibilities of the CEPSG and CAS Technicians
- 2.1.1 Any CEPSG and CAS Technicians preparing to replace a Rack Mounted Nested Yellow IR Quadrupole P.S. or QPA shall apply their lock, as described in section 5, to assure their own safety.
- 2.2 Responsibilities of System Specialists
- 2.2.1 System Specialists are responsible for training the CEPSG and CAS Technicians.

### **3. Prerequisites for the CEPSG and CAS Technicians**

- 3.1 The CEPSG and CAS Technicians must be trained in LOTO.
- 3.2 The CEPSG and CAS Technicians must be trained in the use of this procedure and their name must appear on a list maintained by Don Bruno and Bill Anderson. This list is attached in Appendix 4 and will be updated as more people are trained. The training is valid for 1 year.

- 3.3 The CEPSG and CAS Technicians must be trained in Electrical Safety.
- 3.4 The CEPSG and CAS Technicians must wear leather gloves, safety glasses, natural fiber long sleeve shirt and natural fiber long pants when using this procedure for class 0+ hazards. If the hazard is a class 2 then the CEPSG and CAS Technicians must wear cotton underwear, fire retardant long-sleeve shirt and long pants, hardhat with arc rated face shield, safety glasses, leather gloves, leather shoes and hearing protection. If the hazard is a class 4 then the CEPSG and CAS Technicians must wear cotton underwear, FR long-sleeve shirt and FR long pants, hardhat, safety glasses, leather gloves, leather shoes and hearing protection plus multilayer flash suit, and flash suit hood.

#### **4. Precautions for the CEPSG and CAS Technicians**

- 4.1 The CEPSG and CAS Technicians should be aware that there are no partitions between the power supply racks.

#### **5. Procedure**

- 5.1 If you must replace a Rack Mounted Nested Yellow IR Quadrupole P.S. or QPA then write down the name of this p.s. here:\_\_\_\_\_
- 5.2 Next consult the Appendix 1 and make sure the name is in the appendix. You have now confirmed that this p.s. or QPA is a Rack Mounted Nested Yellow IR Quadrupole P.S. or QPA

**Warning:**

If this p.s. does not appear in Appendix 1 then STOP and consult the engineer.

- 5.3 Make sure the Yellow link is down before performing this lockout. MCR can tell you if the link is down. If MCR says the link is not down then tell them you will bring the link down.
- 5.4 Get a lock and go out and look at the p.s. or QPA that must be replaced. See Appendix 1 to find out which building the p.s. or QPA is in and which rack the p.s. or QPA is in. Write down the building and rack number here:  
Building\_\_\_\_\_
- Rack Number\_\_\_\_\_
- 5.5 If the Yellow link is not down then tell MCR you will be bringing the link down but they must run all of the p.s.'s to zero current first.
- 5.6 Once the p.s.'s are at zero current you should put the p.s. that must be replaced into LOCAL and STANDBY from the front panel controls. Now put it in the OFF state. Use the OFF pushbutton on the front of the p.s. to do this. The Yellow link will now come down if it is not down already. If a QPA is being replaced do the same thing to its associated p.s.

- 5.7 If there is another Yellow p.s. in the rack then put it in into STANDBY and then OFF as well.
- 5.8 If there is another Blue p.s. in the rack then tell MCR that the Blue link must also come down. Tell them to run all of the Blue p.s.'s down to zero current first. Once all of the Blue p.s.'s are at zero current you should put this Blue p.s. into LOCAL and STANDBY from the front panel controls. Now put it in the OFF state. Use the OFF pushbutton on the front of the p.s. to do this.

5.9 <b>Caution:</b> If there is a Blue p.s. in the rack then you must also lockout the Blue main quadrupole p.s.'s. This will come up later in the procedure.
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- 5.10 Now that both p.s.'s are in the OFF state you can turn OFF the circuit breakers on the front of the p.s.'s in this rack. Turning off this 208VAC circuit breaker is considered a class 0+ hazard.
- 5.11 Lockout the 208VAC disconnect that feeds this rack. Check off that it has been locked out here (class 2):  
\_\_\_\_\_ (Locked out 208VAC Disconnect)
- 5.12 Go to service building 1004B and turn off the following Yellow main quadrupole power supplies control switches (class 0+) (next step is lockout):  
PYQR\_\_\_\_\_ (CHECK AFTER TURNED OFF)  
PYQFT\_\_\_\_\_ (CHECK AFTER TURNED OFF)
- 5.13 You turn off these main p.s.'s out by turning the red front panel switch to the left. Watch that the lights on the control chassis go off. See Appendix 2 Figure 1 for a photo of the switch.
- 5.14 Before locking out the 480V disconnects observe 480V on all three line to line voltages on the volt meters on the front of the power supplies. Next, make sure all of the lights are flashing on the voltage monitor gauges on the back of the p.s. After you lock out the 480V disconnect switch make sure all three line to line voltages on the volt meters on the front of the power supplies read zero. Next make sure all of the lights are flashing are OFF on the voltage monitor gauges on the back of the p.s.
- 5.15 In 1004B lockout the following Yellow main quadrupole power supplies 480V disconnect switches (class 4). These 480V switches are located along the building parking lot wall. See Appendix 2 Figure 2. These have kirklocks so take the key with you after the switch is locked out:  
SYQR\_\_\_\_\_ (CHECK AFTER LOCKED OUT)  
SYQFT\_\_\_\_\_ (CHECK AFTER LOCKED OUT)
- 5.16 IF THERE WAS a Blue p.s. in the rack with the Yellow p.s. then you must turn off the following Blue main quadrupole power supplies control switches (class 0+) (next step will be lockout):  
PBQR\_\_\_\_\_ (CHECK AFTER TURNED OFF)

PBQFT\_\_\_\_\_ (CHECK AFTER TURNED OFF)

- 5.17 IF THERE WAS a Blue p.s. in the rack with the Yellow p.s. then you must lockout the following Blue main quadrupole power supplies 480V disconnect switches (class 4). These 480V switches are located along the building parking lot wall. These have kirklocks so take the key with you after the switch is locked out. If there was NOT a Blue p.s. in the rack with the Yellow p.s. then you do not have to lock out these Blue p.s.'s.

SBQR\_\_\_\_\_ (CHECK AFTER LOCKED OUT)

SBQFT\_\_\_\_\_ (CHECK AFTER LOCKED OUT)

- 5.18 You can now consult the proper procedure for replacing the p.s. or QPA See Appendix 3 for the procedure titles.
- 5.19 After you have completed replacing the p.s. or QPA you can now unlock the 208VAC disconnect (class 2) for the rack you were working in and turn ON the circuit breakers on the rack mounted p.s.'s.
- 5.20 Next, you can now unlock the main p.s.'s and then restore the regulator to operational conditions. Restore the main p.s. regulator by following this procedure:  
<http://www.c-ad.bnl.gov/ceps/files/pdf/Unlock%20and%20Restore%20MPS.pdf>
- 5.21 If there is a problem getting the above link to work in 5.20 then the procedure in 5.20 is called "Unlocking and Restoring Main PowerSupplies". It can be found by going to this web page:  
<http://www.c-ad.bnl.gov/ceps/Mains.htm>
- 5.22 Once you are done restoring the regulator for the main p.s.'s, tell MCR that they can now bring up the Yellow link up. If the Blue link is down, because there was a Blue p.s. in the rack as well, then they can also bring the Blue link up.

**Appendix 1**  
**NESTED RHIC IR Quadrupole Power Supplies**

<b>BUILDING 1002B</b>					
P.S. Name	Rack Number	P.S. Name	Rack Number	P.S. Name	Rack Number
YO1-QD1-PS	R2BYQF1	BO2-QF8-PS	R2BQD1	BI1-QF1-PS	R2BBQF1
YI2-QF1-PS	“	B2-Q89-PS	“	BO2-QD1-PS	“
YO1-QF2-PS	R2BYQF2	YO1-QF8-PS*	R2BQD2	BI1-QD2-PS	R2BBQF2
YO1-QD3-PS	“	BI1-QF9-PS*	“	BI1-QF3-PS	“
YI2-QD2-PS	R2BYQF3	YI2-QF9-PS	R2BQD3	BO2-QF2-PS	R2BBQF3
YI2-QF3-PS	“	Y2-Q89-PS	“	BO2-QD3-PS	“
Y2-Q6-PS	R2BYQF4			B2-Q6-PS	R2BBQF4
Y2-Q7-PS	R2BYQF5			B2-Q7-PS	R2BBQF5
<b>BUILDING 1004B</b>					
P.S. Name	Rack Number	P.S. Name	Rack Number	P.S. Name	Rack Number
BI4-QF9-PS	R4BQDF1	BO3-QD1-PS	R4BBQF1	YI3-QF1-PS	R4BYQF1
B4-Q89-PS	“	BO3-QF6-PS	“	YI3-QD6-PS	“
YI3-QF9-PS*	R4BQDF2	BO3-QF2-PS	R4BBQF2	YI3-QD2-PS	R4BYQF2
BO3-QF8-PS*	“	BO3-QD3-PS	“	YI3-QF3-PS	“
YO4-QF8-PS	R4BQDF3	BI4-QD2-PS	R4BBQF3	YO4-QF2-PS	R4BYQF3
Y4-Q89-PS	“	BI4-QF3-PS	“	YO4-QD3-PS	“
BQTRIM-PS	R4BOFF1	BI4-QF1-PS	R4BBQF4	YO4-QD1-PS	R4BYQF4
YQTRIM-PS	R4BOFF2	BI4-QD6-PS	“	YO4-QF6-PS	“
		BO3-QD7-PS	R4BBQD7	YI3-QF7-PS	R4BYQF5
		BI4-QF7-PS	R4BBQF6	YO4-QD7-PS	R4BYQF6
<b>BUILDING 1006B</b>					
P.S. Name	Rack Number	P.S. Name	Rack Number	P.S. Name	Rack Number
BO6-QF8-PS	R6BQD1	BI5-QF1-PS	R6BBQF1	YO5-QD1-PS	R6BYQF1
B6-Q89-PS	“	BO6-QD1-PS	“	YI6-QF1-PS	“
YO5-QF8-PS*	R6BQD2	BI5-QD2-PS	R6BBQF2	YO5-QF2-PS	R6BYQF2
BI5-QF9-PS*	“	BI5-QF3-PS	“	YO5-QD3-PS	“
YI6-QF9-PS	R6BQD3	BO6-QF2-PS	R6BBQF3	YI6-QD2-PS	R6BYQF3
Y6-Q89-PS	“	BO6-QD3-PS	“	YI6-QF3-PS	“
		B6-Q6-PS	R6BBQF4	Y6-Q6-PS	R6BYQF4
		B6-Q7-PS	R6BBQF5	Y6-Q7-PS	R6BYQF5
<b>BUILDING 1008B</b>					
P.S. Name	Rack Number	P.S. Name	Rack Number	P.S. Name	Rack Number
BI8-QF9-PS	R8BQD1	BO7-QD1-PS	R8BBQF1	YI7-QF1-PS	R8BYQF1
B8-Q89-PS	“	BI8-QF1-PS	“	YO8-QD1-PS	“
YI7-QF9-PS*	R8BQD2	BO7-QF2-PS	R8BBQF2	YI7-QD2-PS	R8BYQF2
BO7-QF8-PS*	“	BO7-QD3-PS	“	YI7-QF3-PS	“
YO8-QF8-PS	R8BQD3	BI8-QD2-PS	R8BBQF3	YO8-QF2-PS	R8BYQF3
Y8-Q89-PS	“	BI8-QF3-PS	“	YO8-QD3-PS	“
		B8-Q6-PS	R8BBQF4	Y8-Q6-PS	R8BYQF4
		B8-Q7-PS	R8BBQF5	Y8-Q7-PS	R8BYQF5

\* Denotes racks with Blue and Yellow supplies together on the same wall fused disconnect.

**Appendix 1 (continued)**  
**NESTED RHIC IR Quadrupole Power Supplies**

<b>BUILDING 1010A</b>					
<b>P.S. Name</b>	<b>Rack Number</b>	<b>P.S. Name</b>	<b>Rack Number</b>	<b>P.S. Name</b>	<b>Rack Number</b>
BO10-QF8-PS	R10AQD1	BI9-QF1-PS	R10ABQF1	YO9-QD1-PS	R10AYQF1
BO10-QD9-PS	“	BI9-QD6-PS	“	YO9-QF6-PS	“
BI9-QF9-PS	R10AQD2	BI9-QD2-PS	R10ABQF2	YO9-QF2-PS	R10AYQF2
BI9-Q89-PS	“	BI9-QF3-PS	“	YO9-QD3-PS	“
YO9-QF8-PS	R10AQD3	BO10-QF2-PS	R10ABQF3	YI10-QD2-PS	R10AYQF3
YO9-QD9-PS	“	BO10-QD3-PS	“	YI10-QF3-PS	“
YI10-QF9-PS	R10AQD4	BO10-QD1-PS	R10ABQF4	YI10-QF1-PS	R10AYQF4
YI10-Q89-PS	“	BO10-QF6-PS	“	YI10-QD6-PS	“
		BI9-QF7-PS	R10ABQF5	YO9-QD7-PS	R10AYQF5
		BO10-QD7-PS	R10ABQF6	YI10-QF7-PS	R10AYQF6
<b>BUILDING 1012A</b>					
<b>P.S. Name</b>	<b>Rack Number</b>	<b>P.S. Name</b>	<b>Rack Number</b>	<b>P.S. Name</b>	<b>Rack Number</b>
BO11-QD1-PS	R12ABQF1	YI11-QF1-PS	R12AYQF1	BI12-QF9-PS	R12AQD1
BI12-QF1-PS	“	YO12-QD1-PS	“	B12-Q89-PS	“
BO11-QF2-PS	R12ABQF2	YI11-QD2-PS	R12AYQF2	YI11-QF9-PS*	R12AQD2
BO11-QD3-PS	“	YI11-QF3-PS	“	BO11-QF8-PS*	“
BI12-QD2-PS	R12ABQF3	YO12-QF2-PS	R12AYQF3	YO12-QF8-PS	R12AQD3
BI12-QF3-PS	“	YO12-QD3-PS	“	Y12-Q89-PS	“
B12-Q6-PS	R12ABQF4	Y12-Q6-PS	R12AYQF4		
B12-Q7-PS	R12ABQF5	Y12-Q7-PS	R12AYQF5		
<b>BUILDING 1002B</b>					
<b>QPA Name</b>	<b>Rack Number</b>	<b>QPA Name</b>	<b>Rack Number</b>	<b>QPA Name</b>	<b>Rack Number</b>
YO1-QD1-QP	R2BYQF1	BO2-QF8-QP	R2BQD1	BI1-QF1-QP	R2BBQF1
YI2-QF1-QP	“	B2-Q89-QP	“	BO2-QD1-QP	“
YO1-QF2-QP	R2BYQF2	YO1-QF8 – QP*	R2BQD2	BI1-QD2-QP	R2BBQF2
YO1-QD3-QP	“	BI1-QF9-QP*	“	BI1-QF3-QP	“
YI2-QD2-QP	R2BYQF3	YI2-QF9-QP	R2BQD3	BO2-QF2-QP	R2BBQF3
YI2-QF3-QP	“	Y2-Q89-QP	“	BO2-QD3-QP	“
Y2-Q6-QP	R2BYQF4			B2-Q6-QP	R2BBQF4
Y2-Q7-QP	R2BYQF5			B2-Q7-QP	R2BBQF5
<b>BUILDING 1004B</b>					
<b>QPA Name</b>	<b>Rack Number</b>	<b>QPA Name</b>	<b>Rack Number</b>	<b>QPA Name</b>	<b>Rack Number</b>
BI4-QF9-QP	R4BQDF1	BO3-QD1-QP	R4BBQF1	YI3-QF1-QP	R4BYQF1
B4-Q89-QP	“	BO3-QF6-QP	“	YI3-QD6-QP	“
YI3-QF9-QP*	R4BQDF2	BO3-QF2-QP	R4BBQF2	YI3-QD2-QP	R4BYQF2
BO3-QF8 –QP*	“	BO3-QD3-QP	“	YI3-QF3-QP	“
YO4-QF8-QP	R4BQDF3	BI4-QD2-QP	R4BBQF3	YO4-QF2-QP	R4BYQF3
Y4-Q89-QP	“	BI4-QF3-QP	“	YO4-QD3-QP	“
B-QTRIM-QP	R4BOFF1	BI4-QF1-QP	R4BBQF4	YO4-QD1-QP	R4BYQF4
YQTRIM-QP	R4BOFF2	BI4-QD6-QP	“	YO4-QF6-QP	“
		BO3-QD7-QP	R4BBQD7	YI3-QF7-QP	R4BYQF5
		BI4-QF7-QP	R4BBQF6	YO4-QD7-QP	R4BYQF6

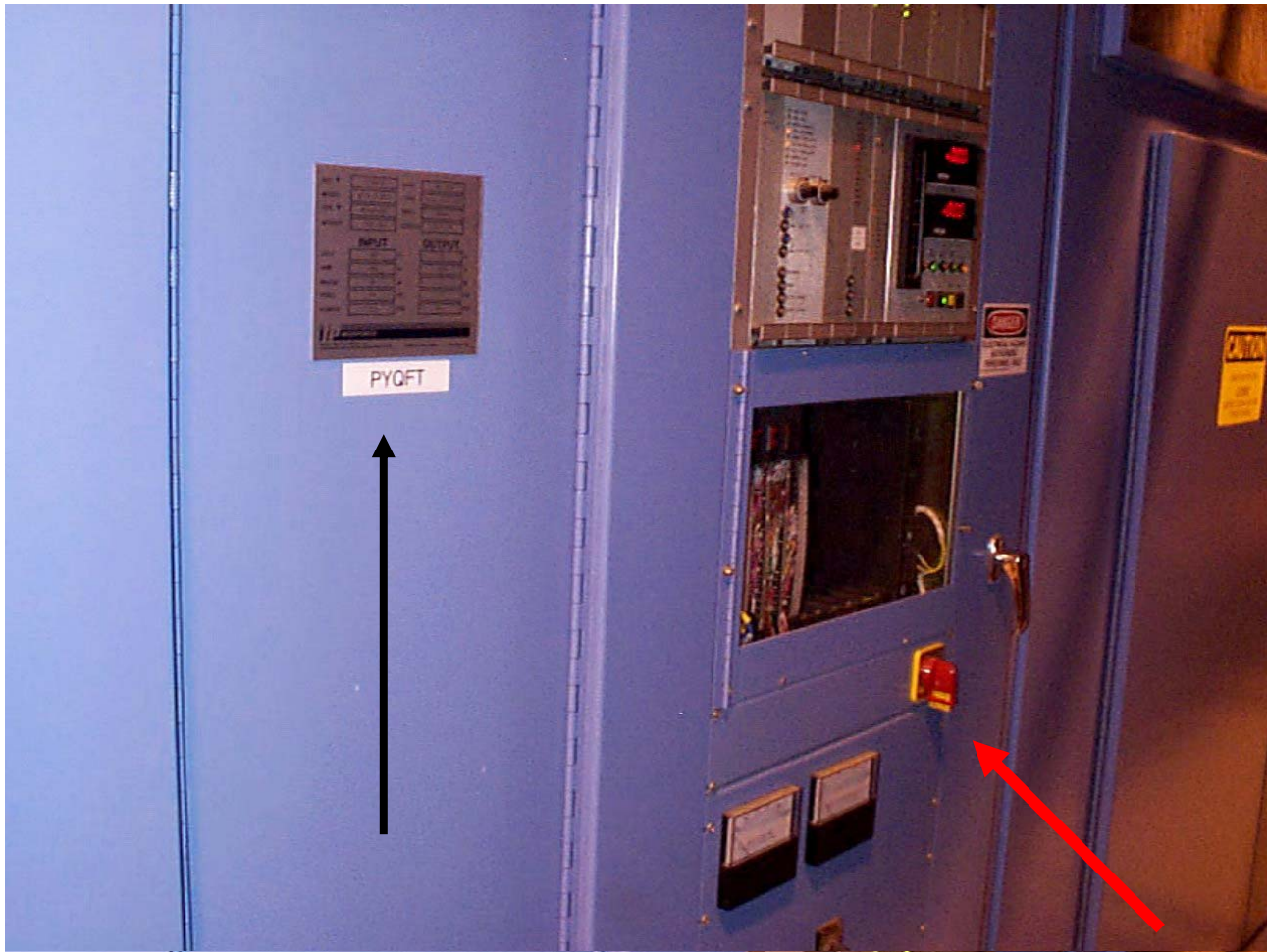


**Appendix 1 (continued)**  
**NESTED RHIC IR Quadrupole Power Supplies**

<b>BUILDING 1006B</b>					
QPA Name	Rack Number	QPA Name	Rack Number	QPA Name	Rack Number
BO6-QF8-QP	R6BQD1	BI5-QF1-QP	R6BBQF1	YO5-QD1-QP	R6BYQF1
B6-Q89-QP	“	BO6-QD1-QP	“	YI6-QF1-QP	“
YO5-QF8-QP*	R6BQD2	BI5-QD2-QP	R6BBQF2	YO5-QF2-QP	R6BYQF2
BI5-QF9-QP*	“	BI5-QF3-QP	“	YO5-QD3-QP	“
YI6-QF9-QP	R6BQD3	BO6-QF2-QP	R6BBQF3	YI6-QD2-QP	R6BYQF3
Y6-Q89-QP	“	BO6-QD3-QP	“	YI6-QF3-QP	“
		B6-Q6-QP	R6BBQF4	Y6-Q6-QP	R6BYQF4
		B6-Q7-QP	R6BBQF5	Y6-Q7-QP	R6BYQF5
<b>BUILDING 1008B</b>					
QPA Name	Rack Number	QPA Name	Rack Number	QPA Name	Rack Number
BI8-QF9-QP	R8BQD1	BO7-QD1-QP	R8BBQF1	YI7-QF1-QP	R8BYQF1
B8-Q89-QP	“	BI8-QF1-QP	“	YO8-QD1-QP	“
YI7-QF9-QP*	R8BQD2	BO7-QF2-QP	R8BBQF2	YI7-QD2-QP	R8BYQF2
BO7-QF8-QP*	“	BO7-QD3-QP	“	YI7-QF3-QP	“
YO8-QF8-QP	R8BQD3	BI8-QD2-QP	R8BBQF3	YO8-QF2-QP	R8BYQF3
Y8-Q89-QP	“	BI8-QF3-QP	“	YO8-QD3-QP	“
		B8-Q6-QP	R8BBQF4	Y8-Q6-QP	R8BYQF4
		B8-Q7-QP	R8BBQF5	Y8-Q7-QP	R8BYQF5
<b>BUILDING 1010A</b>					
QPA Name	Rack Number	QPA Name	Rack Number	QPA Name	Rack Number
BO10-QF8-QP	R10AQD1	BI9-QF1-QP	R10ABQF1	YO9-QD1-QP	R10AYQF1
BO10-QD9-QP	“	BI9-QD6-QP	“	YO9-QF6-QP	“
BI9-QF9-QP	R10AQD2	BI9-QD2-QP	R10ABQF2	YO9-QF2-QP	R10AYQF2
BI9-Q89-QP	“	BI9-QF3-QP	“	YO9-QD3-QP	“
YO9-QF8-QP	R10AQD3	BO10-QF2-QP	R10ABQF3	YI10-QD2-QP	R10AYQF3
YO9-QD9-QP	“	BO10-QD3-QP	“	YI10-QF3-QP	“
YI10-QF9-QP	R10AQD4	BO10-QD1-QP	R10ABQF4	YI10-QF1-QP	R10AYQF4
YI10-Q89-QP	“	BO10-QF6-QP	“	YI10-QD6-QP	“
		BI9-QF7-QP	R10ABQF5	YO9-QD7-QP	R10AYQF5
		BO10-QD7-QP	R10ABQF6	YI10-QF7-QP	R10AYQF6
<b>BUILDING 1012A</b>					
QPA Name	Rack Number	QPA Name	Rack Number	QPA Name	Rack Number
BO11-QD1-QP	R12ABQF1	YI11-QF1-QP	R12AYQF1	BI12-QF9-QP	R12AQD1
BI12-QF1-QP	“	YO12-QD1-QP	“	B12-Q89-QP	“
BO11-QF2-QP	R12ABQF2	YI11-QD2-QP	R12AYQF2	YI11-QF9-QP*	R12AQD2
BO11-QD3-QP	“	YI11-QF3-QP	“	BO11-QF8-QP*	“
BI12-QD2-QP	R12ABQF3	YO12-QF2-QP	R12AYQF3	YO12-QF8-QP	R12AQD3
BI12-QF3-QP	“	YO12-QD3-QP	“	Y12-Q89-QP	“
B12-Q6-QP	R12ABQF4	Y12-Q6-QP	R12AYQF4		
B12-Q7-QP	R12ABQF5	Y12-Q7-QP	R12AYQF5		

\* Denotes racks with Blue and Yellow supplies together on the same wall fused disconnect.

## Appendix 2

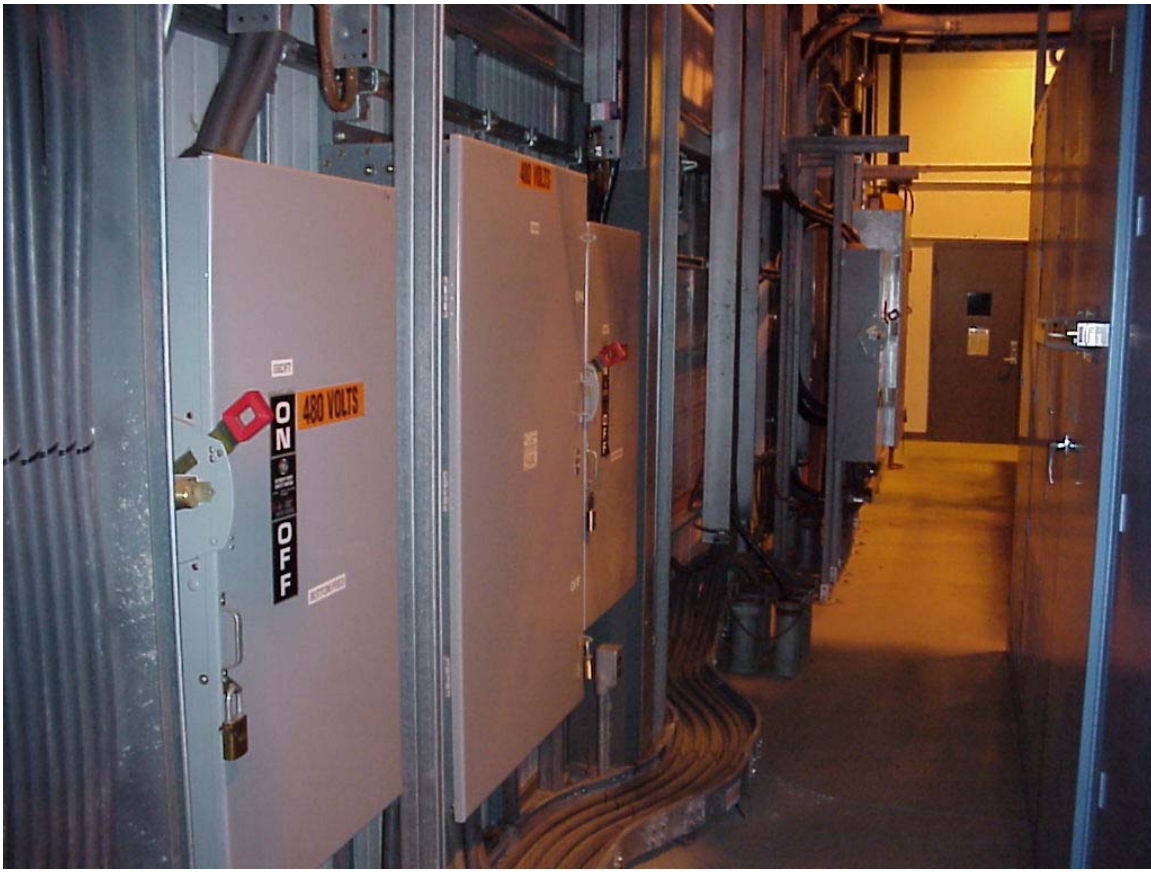


**Figure 1** Photo of one RED Front Panel Switch for the PYQFT Main p.s.

The Red Arrow is pointing to the RED switch you must turn off for the main p.s. PYQFT

The Black Arrow is pointing to the label that tells you which p.s. this is.

Appendix 2 (continued)



**Figure 2:** 480V disconnect switches for main quadrupole p.s.'s along parking lot wall

**Appendix 3**  
**Table of Procedures for Replacing Nested p.s.'s**

<b>SiteWide Name Contains</b>	<b>Procedure Title</b>
Qd2 or qf2	Nested Suncraft 150A P.S. Replacement Procedure
Q89 or qd9	Nested Suncraft 300A P.S. Replacement Procedure
Qd1, qf1, qd3, qf3, qf6, qd6, q6, qf8, qf9	Nested Rack Mounted Dynapower P.S. Replacement Procedure
Qd2, qf2, q89, qd9, qd1, qf1, qd3, qf3, qf6, qd6, q6, qf8, qf9	Nested Rack Mounted QPA Replacement Procedure
Qd2, qf2, q89, qd9, qd1, qf1, qd3, qf3, qf6, qd6, q6, qf8, qf9	IGBT Card Replacement Procedure For Rack Mounted QPA's Only

All of these procedures can be found on the following web page:

<http://www.c-ad.bnl.gov/ceps/onlinedocs.htm>

## **Appendix 4**

## Lockout Procedure For the Blue IR Quadrupole Rack Mounted Nested Power Supplies During Running Periods When a Power Supply Must be Replaced

List of People Trained. Training is valid for 1 year

[illegible]